WHAT IS CLAIMED IS:

1. An electronic ballast for a gas discharge lamp; said electronic ballast comprising an input a-c circuit; a common mode inductor for connecting said input a-c circuit to a bridge connected rectifier; an inverter circuit including a high side switch and a low side switch which is coupled to said bridge connected rectifier; and a resonant circuit coupling said inverter circuit to and driving said gas discharge lamp; and a monitor circuit coupled to said common mode inductor for sensing a high frequency fault ground current, which has a frequency greater than the frequency of said input a-c circuit, to a ground connection; and a controller circuit coupled to said monitor circuit for turning off at least one of said inverter circuit and power to said inverter circuit when said high frequency ground current exceeds a given value.

2. The ballast of claim 1 which further includes a DC to DC PFC converter connected between said bridge connected rectifier and said inverter; said controller circuit having an output connected to said DC to DC PFC converter.

3. The ballast of claim 1 wherein said monitor circuit includes an auxiliary winding on said common mode inductor, and diode means connected between said auxiliary winding and said controller.

4. An electronic ballast for at least two parallel connected gas discharge lamps removably

mounted in a fixture, said ballast comprising an inverter circuit, a resonant coupling circuit and at least two gas discharge lamps; said gas discharge lamps having first and second filaments; said resonant coupling circuit including an inductor and a capacitor connected in series with said first and second filaments; first and second windings coupled to said inductor; first and second diodes connected in series with said first and second windings respectively and said first and second diodes respectively, whereby the disconnection of said lamps and said filaments from their fixtures opens the output circuit from said inverter circuit.

5. The ballast of claim 4 wherein said resonant circuit further includes a second capacitor connected across said gas discharge lamp.

6. The ballast of claim 4 wherein said inverter circuit includes a series connected high side MOSgated device and a low side MOSgated device; and a control circuit for alternately turning on and off said high side and low side MOSgated devices; said series connected capacitor and inductor, said first and second filaments, and said low side MOSgated device connected in a closed series circuit.

7. The ballast of claim 6 wherein said resonant circuit further includes a second capacitor connected across said gas discharge lamp.

8. The ballast of claim 1 wherein said gas discharge lamp has first and second filaments; said

resonant coupling circuit including an inductor and a capacitor connected in series with said first and second filaments; first and second windings coupled to said inductor; first and second diodes connected in series with said first and second windings respectively and said first and second diodes respectively, whereby the disconnection of said lamp and said filaments from its fixture opens the output circuit from said inverter circuit.

9. The ballast of claim 8 wherein said resonant circuit further includes a second capacitor connected across said gas discharge lamp.

10. The ballast of claim 9 wherein said inverter circuit includes a series connected high side MOSgated device and a low side MOSgated device; and a control circuit for alternately turning on and off said high side and low side MOSgated devices; said series connected capacitor and inductor, said first and second filaments, and said low side MOSgated device connected in a closed series circuit.

11. An electronic ballast for a gas discharge lamp, said ballast comprising: an input a-c circuit; an a-c filter connected to said input a-c circuit; a rectifier bridge connected to said a-c circuit for producing an output d-c voltage from said a-c circuit input; an inverter circuit including a high side switch and a low side switch connected in series at a node and connected across the output of said inverter circuit and a load circuit connected to said node and including said gas discharge lamp; said

high side and low side switches each having input control terminals energizable to turn them on and off and each having a parallel diode; a master control circuit for applying suitably timed control signals for alternately turning said high side and low side switches on and off; and a dynamic dead time control circuit in said master control circuit for insuring only a short interval between the end of current conduction by either said high side and low side devices and the beginning of conduction by the other by the control of the application of controls signals to their control terminals; said dynamic dead time control circuit being coupled to and monitoring at least one of the current in said resonant load, the current in said first and second switches, the output voltage of said rectifier bridge or the rate of change dv/dt of said bridge voltages and adjusting the application of turn on signals to said high side and low side switches for both capacitive and inductive operations.

12. The ballast of claim 11 which further includes a PFC stage coupled between said rectifier bridge and said inverter.

13. The ballast of claim 11 wherein said gas discharge lamp has first and second filaments; said resonant coupling circuit including an inductor and a capacitor connected in series with said first and second filaments; first and second windings coupled to said inductor; first and second diodes connected in series with said first and second windings respectively and said first and second diodes

respectively, whereby the disconnection of said lamp and said filaments from its fixture opens the output circuit from said inverter circuit.

14. The ballast of claim 11 wherein said a-c filter includes a common mode inductor.

15. The ballast of claim 14, which further includes a monitor circuit coupled to said common mode inductor for sensing a high frequency fault ground current, which has a frequency greater than the frequency of said input a-c circuit, to a ground connection; and a controller circuit coupled to said monitor circuit for turning off the power to said inverter circuit when said high frequency ground current exceeds a given value.

16. The ballast of claim 15 wherein said gas discharge lamp has first and second filaments; said resonant coupling circuit including an inductor and a capacitor connected in series with said first and second filaments; first and second windings coupled to said inductor; first and second diodes connected in series with said first and second windings respectively and said first and second diodes respectively, whereby the disconnection of said lamp and said filaments from its fixture opens the output circuit from said inverter circuit.

17. The device of claim 11 wherein said dynamic dead time control circuit comprises a current transformer in series with said resonant load circuit to measure the current therethrough; and a comparator

circuit for comparing the output of said current transformer to a reference value to generate a dead time interval having à small value.

18. The device of claim 11 wherein said dynamic dead time control circuit comprises a connection to said node for monitoring the voltage at said node and a comparator circuit for composing the output of said current transformer to a reference value to generate a dead time interval having a small value.

19. The device of claim 11 wherein said dynamic dead time control circuit comprises a dv/dt circuit coupled to said node for monitoring the dv/dt at said node and a comparator circuit for comparing the output of said current transformer to a reference value to generate a dead time interval having a small value.

20. The ballast of Claim 11, wherein said ballast operates at least two gas discharge lamps connected in parallel, said gas discharge lamps each having first and second filaments; said resonant coupling circuit including an inductor and a capacitor connected in series with said first and second filaments; first and second windings coupled to said inductor; first and second diodes connected in series with said first and second windings respectively and said first and second diodes respectively, whereby the disconnection of all of said lamps and said filaments from their fixtures opens the output circuit from said inverter circuit.

21. The ballast of Claim 15, wherein said ballast operates at least two gas discharge lamps connected in parallel, said gas discharge lamps each having first and second filaments; said resonant coupling circuit including an inductor and a capacitor connected in series with said first and second filaments; first and second windings coupled to said inductor; first and second diodes connected in series with said first and second windings respectively and said first and second diodes respectively, whereby the disconnection of all of said lamps and said filaments from their fixtures opens the output circuit from said inverter circuit.

22. An electronic control module for controlling the operation of an electronic ballast for at least one lamp, said control module comprising:

an integrated circuit, said integrated circuit operable in accordance with control information to drive a first switch and a second switch to power said at least one lamp using a combination of pulse width modulation and frequency modulation; and

a first memory coupled to said integrated circuit, said first memory storing a plurality of parameters tables, each parameters table having said control information for said integrated circuit.

23. The electronic control module of claim 22, wherein at least one of said plurality of parameters tables is user programmable.

24. The electronic control module of claim 22, wherein said electronic ballast is dimmable, said integrated circuit controls said dimming operation by varying the combination of pulse width modulation and frequency modulation applied to said first and second switches.

25. The electronic control module of claim 24, wherein said integrated circuit independently controls said first switch and said second switch to achieve zero voltage switching, fully-protected operation.

26. The electronic control module of claim 25, wherein said first switch and said second switch are arranged in a half-bridge configuration, said integrated circuit controlling the operation of said first and second switches to maintain an inductive half-bridge load which operates approximately at resonance by driving a respective one of said first and second switches under reverse conduction when a voltage across said corresponding switch is approximately zero.

27. The electronic control module of claim 24, wherein current through said at least one lamp is monitored by said integrated circuit, said integrated circuit controlling said current to maintain a dimming level of said at least one lamp.

28. The electronic control module of claim 27, wherein at least one parameter in each of said at least one parameters tables is a linear representation

of a segment of a non-linear portion of a light level to lamp current curve.

29. The electronic control module of claim 22, wherein said control module further comprises a power line carrier interface and a direct current control, said control module being operable in at least one of the following modes:

a dimmable electronic ballast controlled from a wall control unit via said power line carrier interface;

a dimmable electronic ballast controlled from a wall control unit via said direct current control interface;

a dimmable electronic ballast controlled at least one infrared light and occupancy sensor;

a dimmable electronic ballast controlled at least one occupancy sensor;

a non-dimmable electronic ballast.

30. The electronic control module of claim 22, further comprising at least one protection circuit.

31. The electronic control module of claim 30, wherein said protection circuit comprises at least one of:

a current limiting protection circuit, said current limiting protection circuit causing an inhibition of drive signals to said first and second switches when a predetermined amount of current is being drawn by said first and second switches;

an abnormal shut down protection circuit, said abnormal shut down protection circuit shutting down drive signals to said first and second switches when a catastrophic failure of said ballast control module is detected;

an over-voltage protection sense circuit, said over-voltage protection circuit causing an inhibition of drive signals to said first and second switches when a predetermined voltage drop is detected across said first and second switches; and

a capacitive operation protection circuit, said capacitive operation protection circuit increasing a dead time interval in operating said first and second switches when a load on said electronic ballast becomes capacitive.

32. The electronic control module of claim 22, wherein said first memory is located within a same application specific integrated circuit as said integrated circuit.

33. An integrated circuit for controlling the operation of an electronic lamp ballast, said integrated circuit comprising:

a central logic supervisor controlling the overall operation of said electronic lamp ballast;

a dc/ac generator module, said dc/ac generator module being coupled to said central logic supervisor and providing drive signals for an inverter circuit, said inverter circuit having a first switch and a second switch;

a power line controller module, said power line controller module being coupled to said central

logic supervisor and receiving dimming control data across a power line; and

a power factor correction module, said power factor correction module being coupled to said central logic supervisor and controlling power factor detection and correction for said electronic lamp ballast.

34. The integrated circuit of claim 33, wherein said integrated circuit operates in accordance with control information arranged in as a plurality of parameters tables.

35. The integrated circuit of claim 33, wherein said dc/ac generator module is comprised of:

a first pulse width modulator logic circuit;

a second pulse width modulator logic circuit;

a first latch coupled to said first pulse width modulator logic circuit and providing first pulse data to said first pulse width modulator logic ,

a second latch coupled to said second pulse width modulator logic circuit and providing second pulse data to said second pulse width modulator logic;

said first pulse width modulator circuit and second pulse width modulator logic circuit being coupled together to generate a pulse train having a pulse width determined in accordance with said first pulse data and said second pulse data;

a dead time controller coupled to said first pulse width modulator circuit and second pulse width modulator logic circuit for adjusting said pulse train to dynamically vary a dead time interval to ensure

only a short interval between the end of current conduction by either of said first switch or said second switch and the beginning of conduction for the other of said first switch or said second switch; and

an abnormal logic circuit, said abnormal logic circuit monitoring said pulse train to detect a presence or absence of a condition in which said pulse train overlaps with an output of said first pulse width modulator circuit.

36. The integrated circuit of claim 35, wherein said abnormal logic circuit comprises a first counter and a monitoring module, said first counter being incremented when said monitoring module detects that said pulse train does not overlap with said output of said first pulse width modulator circuit, said first counter generating an abnormal condition message upon reaching a first predetermined quantity.

37. The integrated circuit of claim 36, wherein said abnormal logic circuit further comprises a second counter, said second counter allowing said da/ac module to perform a predetermined quantity of pulse train cycles when:

said monitoring module detects that said pulse train does not overlap with said output of said first pulse width modulator circuit; and

said first predetermined quantity has not been reached.

38. The integrated circuit of claim 33, wherein said dc/ac module controls a dimming operation of at least one lamp coupled to said electronic lamp

ballast by varying a combination of pulse width modulation and frequency modulation applied to said first and second switches.

39. The integrated circuit of claim 33, wherein said integrated circuit independently controls said first switch and said second switch to achieve zero voltage switching, fully-protected operation.

40. The integrated circuit of claim 39, wherein said first switch and said second switch are arranged in a half-bridge configuration, said integrated circuit controlling the operation of said first and second switches to maintain an inductive half-bridge load which operates approximately at resonance by driving a respective one of said first and second switches under reverse conduction when a voltage across said corresponding switch is approximately zero.

41. The integrated circuit of claim 38, wherein current through said at least one lamp is monitored by said dc/ac module, said dc/ac module controlling said current to maintain a dimming level of said at least one lamp.

42. The integrated circuit of claim 41, wherein said integrated circuit operates in accordance with parameters retrieved from a parameters table.

43. The integrated circuit of claim 42, wherein at least one parameter in said parameters table is a linear representation of a segment of a

non-linear portion of a light level to lamp current curve.

44. The integrated circuit of claim 33, wherein said power line control module further comprises a power line carrier interface and said central logic supervisor comprises a direct current control, said integrated circuit being operable in at least one of the following modes:

a dimmable electronic ballast controlled from a wall control unit via said power line carrier interface;

a dimmable electronic ballast controlled from a wall control unit via said direct current control interface;

a dimmable electronic ballast controlled at least one infrared light and occupancy sensor;

a dimmable electronic ballast controlled at least one occupancy sensor;

a non-dimmable electronic ballast.

45. The integrated circuit of claim 33, further comprising at least one protection circuit.

46. The integrated circuit of claim 45, wherein said protection circuit comprises at least one of:

a current limiting protection circuit, said current limiting protection circuit causing an inhibition of drive signals to said first and second switches when a predetermined amount of current is being drawn by said first and second switches;

an abnormal shut down protection circuit, said abnormal shut down protection circuit shutting down drive signals to said first and second switches when a catastrophic failure of said ballast control module is detected;

an over-voltage protection sense circuit, said over-voltage protection circuit causing an inhibition of drive signals to said first and second switches when a predetermined voltage drop is detected across said first and second switches; and

a capacitive operation protection circuit, said capacitive operation protection circuit increasing a dead time interval in operating said first and second switches when a load on said electronic ballast becomes capacitive.

47. A method for controlling the dimming operation of an electronic ballast, comprising the steps of:

monitoring a current through a load coupled to said electronic ballast; and

controlling said current to maintain a dimming level.

48. The method of claim 47, wherein said current is controlled by controlling the operation of a first switch and a second switch to maintain an inductive half-bridge load which operates approximately at resonance by driving a respective first one of said first and second switches under reverse conduction when a voltage across said corresponding switch is approximately zero.